



Early Journal Content on JSTOR, Free to Anyone in the World

This article is one of nearly 500,000 scholarly works digitized and made freely available to everyone in the world by JSTOR.

Known as the Early Journal Content, this set of works include research articles, news, letters, and other writings published in more than 200 of the oldest leading academic journals. The works date from the mid-seventeenth to the early twentieth centuries.

We encourage people to read and share the Early Journal Content openly and to tell others that this resource exists. People may post this content online or redistribute in any way for non-commercial purposes.

Read more about Early Journal Content at <http://about.jstor.org/participate-jstor/individuals/early-journal-content>.

JSTOR is a digital library of academic journals, books, and primary source objects. JSTOR helps people discover, use, and build upon a wide range of content through a powerful research and teaching platform, and preserves this content for future generations. JSTOR is part of ITHAKA, a not-for-profit organization that also includes Ithaka S+R and Portico. For more information about JSTOR, please contact support@jstor.org.

MINERALOGY AND PETROGRAPHY.¹

Petrographical News.—Among the several brochures lately published explanatory of the new map of France, one by Lacroix² contains two articles. The first is descriptive of the metamorphic and eruptive rocks of Ariège, and the second is on the acid inclusions in the volcanic rocks of the Auvergne. In the former the marbles of Mercus and Arignac are carefully described. In them occur two varieties of humite, brucite, amphibole, phlogopite, scapolite, spinel, corundum, sphene, rutile, zircon, and many other less common minerals. One variety of the humite occurs in rounded crystals of a clear yellow color, that become colorless in thin section. The other variety is light orange, becoming golden yellow in the section. Both possess the same optical properties, except that the orange crystals are pleochroic in pale yellow and light golden-yellow tints. They are classed by the author with the clino-humites. Their alteration products are interesting. The most usual alteration is into brucite, found either in little plates, often several millimeters in length, or in fibres forming aureoles around unaltered cores of humite. Another alteration is into chrysotile. This is rare, and the change is usually incomplete. A third method of decomposition is into a granular mixture of secondary calcite, dolomite, and small grains of the original mineral. The amphibole in the rocks is pargasite. Two varieties of spinel were observed, one a violet and often transparent variety, and the other green pleonast. The violet spinel often accompanies the pargasite and humite. Both spinels are almost always surrounded by a circle of colorless chlorite in thin plates, and this in turn by a zone of secondary calcite and an outer rim of brucite. The rutile merits special attention, because what appears to be the ordinary black variety is found in thin section to be sometimes this, and sometimes like the violet rutile of the amphibole and pyroxene gneisses of Norway. The pyroxene and amphibole gneisses of this region and the wernerite gneisses present few peculiarities. The marbles, pyroxene gneisses, and granulites of St. Barthélemy are all marked by interesting features. The accessory components of the marbles are almost exclusively graphite, scapolite, pyroxene; and occasionally oligoclase, the last three forming rounded grains rarely surpassing a millimeter and a half in diameter.

¹ Edited by Dr. W. S. Bayley, Colby University, Waterville, Me.

² Bull. des Serv. d. l. Carte. géol. d. France, No. 11, T. II.

The peridotite contains hypersthene and amphibole. Its olivine is perfectly fresh, and is in irregular grains imbedded in the amphiboloids. Some of the granulites contain corroded crystals of bright red andalusite, and also black tourmaline, sphene, muscovite, and garnet disseminated in a ground-mass of feldspar and quartz. Other granulites are very rich in cordierite, and these are in general less rich in quartz than are those bearing andalusite. Micaceous and quartzitic schists from the neighborhood of Ax embrace zircon, apatite, sphene, magnetite, and numerous other materials, thought to be due to the action of the granulite on the schists. On the granulite side of the contact this rock is found to be charged with andalusite, and often with cordierite. Pyroxenites consist of a colorless diopside, zoisite, garnet, calcite, occasionally quartz, and frequently vesuvianite, of which latter it is possible to isolate beautiful amber-yellow crystals of the variety egeran. In the second article by the same author is a discussion of the changes effected in acid inclusions by the basaltic and acid rocks of Auvergne. Two classes of these inclusions are recognized, viz., those found in lava streams, and those occurring in volcanic necks. Both classes include granites and gneisses rich in quartz, and frequently containing cordierite, sillimanite, garnet, corundum, diaspore, and zircon. The changes effected in them by the basic lavas varies in intensity, but not materially in kind. In extreme cases the inclusion has been entirely dissolved, with the exception of the insoluble substances, such as sillimanite, zircon, and diaspore, which remain as grains in the volcanic glass. The cleavages of the original feldspars have been accentuated, many liquid and gaseous inclosures have been developed in them, and the optical properties of the orthoclase have been changed. Quartz fragments in the altered forms have been surrounded by aureoles of augite. The new minerals developed in the surrounding rock by the solution of the inclusion are spinel, hypersthene, and sometimes labradorite, sometimes forming holocrystalline aggregates, and at other times occurring as individual grains bathed in a vitreous paste. In each case the minerals are met with only in the lava that has been injected between the components of the inclusions. They are not present in the magma enclosing them. The inclusions in the andesites and trachytes of the region are gneisses and kersantites. In most respects the changes that have been produced in them are analogous to those produced by the basalts. Much new feldspar has been generated in them, and this is usually optically continuous with the original feldspar to which it is attached. Tridymite is also an abundant new product, as are also spinel and hypersthene. All these minerals are

produced in the inclusion; whereas in the case of the basaltic alteration the last two are found in the metamorphosed rock. In a later article Lacroix³ summarizes the results of his study of inclusions, with reference especially to those of the Haute-Loire. When the inclusions are of the same composition as the enclosing rock, the former have in general been well preserved. If, on the contrary, the inclusion differs in its silica content from the surrounding rock, it is easily destroyed, merely traces of it remaining to mark its former presence.—Graywacke in contact with granite in the Lausitz, Saxony, is changed to knotty (Knoten) graywackes, in which muscovite, biotite, quartz, feldspar, and tourmaline occur as new products, and finally into a quartz-mica rock with cordierite, tourmaline, and some other new products. On the granitic side the rock has assumed a gneissic aspect, thought by Herrimann and Weber⁴ to be the result of flowage.—The micro structure of several calcareous oölites from Iowa, and of siliceous oölites from Pennsylvania, is represented by Messrs. Barbour and Torrey⁵ as concretionary in most cases, while in others the spherules have a brecciated or mosaic appearance. Analyses of several kinds of oölites are given in the paper.

New Minerals.—*Castanite*, associated with barite occurs on a copiapite specimen from Sierra Gordo, Chili, in the form of large, brown, prismatic crystals, without well-developed faces. According to Darapsky⁶ their streak is orange, hardness 3, and density 2.18. They are but slightly soluble in water or in cold hydrochloric acid, but easily dissolve in hot acid. Their composition ($\text{SO}_3 = 33.80$; $\text{Fe}_2\text{O}_3 = 33.92$; $\text{H}_2\text{O} = 30.76$; barite = 1.15) corresponds to $\text{Fe}(\text{FeO})(\text{SO}_4)_2 + 8\text{H}_2\text{O}$. The crystallization is probably monoclinic.—*Manganopectolite* is associated with ozarkite and other decomposition products of *elæolite-syenite* at Magnet Cove, Ark.⁷ On a fresh fracture the mineral is light gray and transparent. On its exterior it is covered with an opaque coating of brown manganese oxide. The crystals are bounded by oP , ∞P_∞ , $+2\text{P}_\infty$ and ∞P_∞ , and their axial ratio is $a : b : c = 1.0731 : 1 : 4840$. Their habit is thick tabular. Cleavage is perfect, parallel to oP and ∞P_∞ . Hardness = 5, and density 2.845. Composition :

SiO_2	Fe_2O_3	CaO	MnO	Na_2O	H_2O	CO_2
53.03	.10	30.28	4.25	8.99	2.43	.82

³ Bull. Soc. Franç. d. Min., XIII., 1890, p. 100.

⁴ Neues Jahrb. f. Min., etc., 1890, II., p. 187.

⁵ Amer. Jour. Sci., Sept., 1890, p. 246.

⁶ Neues Jahrb. f. Min., etc., 1890, II., p. 267.

⁷ J. F. Williams. Zeits. f. Kryst., XVII., 1890, p. 386.

Correcting for the small amount of calcite present, the analysis corresponds with the formula $(\frac{9}{10} \text{Ca}, \frac{1}{10} \text{Mn})_2 \text{NaH}(\text{SiO}_3)_3$ —a pectolite with a tenth of its calcium replaced by manganese. In its optical properties the new mineral agrees well with the view that it is closely allied to pectolite. Its axial plane is $\infty \bar{P}\infty$, with b the acute bisectrix. The double refraction is positive, and the dispersion is strong $s > p$.—*Pinakiolite* and *trimerite* are both new minerals from the Manganese Mines in Sweden. The name of the first refers to its occurrence in small, tabular crystals. It was found by Flink⁸ in granular dolomite at Langbanshyttan, associated with hausmannite. The density of the new mineral is 3.881, and its hardness is 6. It is soluble in strong hydrochloric acid with evolution of chlorine, and before the blowpipe it fuses with difficulty to a black bead. An analysis of the hydrochloric acid solution yielded:

B ₂ O ₃	MgO	Mn ₃ O ₄	Fe ₃ O ₄	CaO	PbO	SiO ₂	H ₂ O
15.65	28.58	49.39	2.07	1.09	.76	1.21	.47

Correcting for silica and water, the formula becomes R_2BMnO_5 , or a manganese *ludwigite*. The black, lustrous crystals are usually orthorhombic, rectangular tables, in which the brachypinacoid is most developed. In addition to this there is present in the mineral only $\infty \bar{P}3$. A definite termination of the c axis is lacking, but since twins with a brachydome as a twinning plane are common, the axial ratio was calculated with this as the unit form, and the following result obtained: $a : b : c = .83385 : 1 : .58807$. Cleavage is parallel to $\infty \bar{P}\infty$. The optical axial plane is oP , with b the negative acute bisectrix. The absorption is $B > A > C$, with $B = c = \text{opaque}$; $A = b = \text{reddish-brown}$, and $C = a = \text{reddish-yellow}$. *Trimerite* ($\tau\epsilon\tau\mu\epsilon\rho\eta\varsigma = \text{three-fold}$) was found at the Harstigsgrube associated with frïedelite implanted on a fine-grained aggregate of magnetite, pyroxene, garnet, etc. The density = 3.474, and hardness = 6–7. The pulverized mineral dissolves in hot hydrochloric acid, with the separation of gelatinous silica. Its composition:

SiO ₂	BeO	MnO	FeO	CaO	MgO
39.77	17.08	26.86	3.87	12.44	.61

corresponds to $(\text{MnBe})\text{SiO}_4$, a manganese *phenacite*. The transparent bright red crystals have an hexagonal habit, due to twinning of triclinic individuals, whose triclinic nature is discoverable only by optical methods. In order to show their relations to the Willemite

⁸ *Zeits. f. Kryst.*, XVIII., 1890, p. 361.

group the author describes the crystals in terms of the hexagonal system with $a : c = 1 : .7233$. They are thick, tabular forms, bounded by ∞P_2 , ∞P , $\frac{3}{2} P_2$, $\frac{3}{4} P_2$ and $\frac{15}{8} P \frac{5}{4}$, and other pyramids with complicated symbols. Brögger finds that sections parallel to ∞P_2 extinguish at about 4° from c . $2V = 83^\circ 29'$, with a very slight dispersion. The angles α , β and γ are all nearly 90° , so that the combination is somewhat similar to the combination of orthorhombic aragonites to produce an apparently hexagonal form. The axial ratio on the assumption of triclinic symmetry becomes $a : b : c = .5744 : 1 : .5425$, and the forms ∞P , $\infty \bar{P}$, ∞P^1 , ∞P , P^1 , P , P_1 , P , $\frac{3}{2} \bar{P}^1_3$, $\frac{3}{2} \bar{P}_1 3$.

Mineral Syntheses.—Boracite has been produced by Gramont⁹ in the wet way. One part of borax and two of magnesium chloride were moistened with water and heated to 275° – 280° in a sealed tube. Little crystals of the mineral thus obtained are bounded by tetrahedrons, octahedrons, and other forms apparently belonging to the regular system. Each tetrahedral face, however, is observed, upon examination, to be composed of small sectors, indicating a grouping of individuals of lower symmetry to produce a pseudo-regular form. When the mixture was heated at a temperature below 265° (the temperature at which natural boracite becomes isotropic) no boracite was obtained, but in its stead there resulted elongated hexagonal crystals of some substance not yet investigated.—One part of alumina and two of silica, according to Vernadsky,¹⁰ unite at a white heat to form a glass which, under the microscope, is seen to be filled with little needles of sillimanite, with the composition : $SiO_2 = 37.31$; $Al_2O_3 = 63.65$. Porcelaine consists essentially of the same substances, viz., a glass holding acicular crystals of sillimanite.—Many of the most important zeolites have been manufactured by Doelter,¹¹ who at the same time has solved some of the problems as to their composition. His method of procedure was to dissolve suitable substances at moderately high temperatures under pressure, and allow them to cool gradually and crystallize. In this way he succeeded in making apophyllite, chabazite, heulandite, natrolite, and skolecite. The author next proceeded to investigate the composition of the minerals formed by heating some specimens to a temperature beyond which they lose water, occasionally examining them chemically and optically, and by fusing others and studying their decomposition products. At 260° apophyllite loses 19 per cent. of its

⁹ Bull. Soc. Franç. d. Min., XIII., 1890, p. 252.

¹⁰ Ib., p. 256.

¹¹ Neues Jahrb. f. Min., etc., I., 1890, p. 118.

water, and above this temperature is decomposed. Just below 260° the hydrate is biaxial, while above this temperature the anhydrous residue is uniaxial. Other zeolites yield similar results. These lead to the conclusion that they all consist of a nepheline, pyroxene, or feldspar-like silicate, combined with meta- or orthosilicic acid, and also an amount of water varying with the temperature. The crystal water may be driven off at high temperature, and taken up again at a lower one, and the various hydrates obtained by the successive steps may possess different crystallographic properties. After a certain amount of loss the minerals refuse to part with more water, which is regarded as chemically combined with silica in the silicic-acid portion of the combination. The author determines incidentally the solubility of several of the zeolites in different solvents, and concludes his paper with a table giving the supposed composition of the members of the group. Heulandite is represented as $\text{CaAl}_2\text{Si}_4\text{O}_{12} + 2\text{H}_2\text{SiO}_3 + 3\text{Aq}$; natrolite as $\text{Na}_2\text{Al}_2\text{Si}_2\text{O}_8 + \text{H}_4\text{SiO}_4$, etc.—Messrs. C. and G. Friedel,¹² by the action of lime on mica in the presence of calcium chloride, obtained small crystals of anorthite, and by the action of soda and sodium sulphate on the same mineral produced little prismatic crystals of a substance differing from nosean in the addition of two molecules of water.¹³

Physical Mineralogy.—The discussion as to the cause of optical anomalies in uniaxial crystals has received another addition in a late article contributed by Martin,¹⁴ in which the writer attempts to show that the Mallard theory with respect to these phenomena is faulty. Mallard believes that the crystals are pseudo-uniaxial; that they consist of several twinned individuals, which by their combination build up a form possessing a geometrical symmetry of higher grade than that belonging to its individual constituents. Martin has examined several organic compounds, and is thereby led to the conclusion that in these the anomalies are due to strain or pressure exerted on some parts of the crystal by the more rapid growth of other parts. It is well known that in many crystals a skeleton is formed first in the act of crystallization, and that this skeleton is subsequently filled in by the deposition of material within its arms. The skeleton thus grows faster than the interstitial substance, and exerts in this latter a strain whose effect is exhibited in the anomalies. Other important thoughts are brought out in the investigation, which appears to have been conducted in a

¹² Bull. Soc. Franc. d. Min., XIII., 1890, p. 233.

¹³ *Ib.*, p. 238.

¹⁴ *Neues Jahrb. f. Min.*, etc., B.B. VII., p. 1.

Am. Nat.—February.—4.

careful and conscientious manner.—Wyruboff,¹⁵ in a reply to Martin's article, states that the latter's results differ but little from his own, and that the conclusions reached by him comprehend no new notions.—The writer last referred to (W.) has recently¹⁶ completed a series of experiments on circularly polarizing substances, by which he seems to have shown that the peculiar property of these bodies is due to their structure, which is described by Mallard as an irregular piling of very small biaxial plates. In this way a high grade of symmetry is imitated, while the plates are really of a low grade. He also adds a nineteenth substance to the list of rotatory polarizing bodies, viz., $(\text{NH}_4)\text{LiSO}_4$, which is apparently biaxial and positive.—The effect of temperature upon the optical and crystallographic constants of prismatic sulphur has been thoroughly investigated by Schrauf,¹⁷ who records his results in an excellent paper of fifty-nine pages. The first part discusses the values of the interfacial angles at different temperatures. The second is confined to refractive phenomena, such as the refractive index for different wave lengths. The third and fourth contain calculations of the values of the optical constants, and the fifth contains a discussion of the relations existing between the refractive indices and the wave length of the transmitted light, temperature, and other factors, and concludes with remarks on the constancy of the refractive and dispersive power, and upon the crystal form of prismatic sulphur.—A paper by Becke¹⁸ on the etching of fluorite is a remarkable exhibit of careful and painstaking work in this branch of physical mineralogy. The author has subjected both natural and prepared faces of crystals from various localities to the action of acids and alkalis of various strengths and at different temperatures, and has studied the results produced. The symmetry of the figures obtained indicate a tetragonal symmetry for the mineral. Anomalous figures on some crystals, found only on planes that show double refraction, are explained as due to the manner of growth. Many new ideas are gathered from the study, one of the most important of which is embodied in a restatement of the law of symmetry of etched figures. These possess the symmetry of the face on which they occur only when this is a natural one free from striations, vicinal planes, etc. Experiments on the solubility of the mineral in different directions lead to the expression of a law of solubility as follows: The rapidity of solubility is equal along equivalent crystallo-

¹⁵ Bull. Soc. Franc. d. Min., XIII., 1890, p. 94.

¹⁶ *Ib.*, p. 215.

¹⁷ *Zeits. f. Kryst.*, XVIII., 1890, p. 114.

¹⁸ *Miner. u. Petrog. Mitth.*, XI., 1890, p. 349

graphic directions, and different along unequivalent directions. Further, the author finds that elevations due to etching (aetzhügel) occur on faces least capable of resisting solution, while depressions (aetzgrübchen) are produced in the least soluble faces. Etching zones, he defines as those containing the planes with the greatest capacity for resisting solution. Many more results of interest are contained in the paper, the character of which is sufficiently indicated by the conclusions above referred to.—The natural etched figures on the topaz of San Louis Potosi, Mexico, correspond in symmetry with the faces on which they occur, with the exception of those on the brachypinacoid $2P_{\infty}$, which are unsymmetrical. According to Pelikan¹⁹ they resemble the figures produced by Baumhauer upon treating the mineral with molten potassa.—Dufet²⁰ obtains 1.54421 as the value of the refractive index of quartz, based on the examination of seventeen different specimens of the mineral.

Miscellaneous.—The cosmic dust (kryokonite) collected by Nordenskjöld in Greenland, in 1883, has been submitted to Wülfing²¹ for investigation, by whom it has been found to consist in greater part of feldspar, quartz, mica, and hornblende. There are present in it also garnet, zircon, magnetite, augite, and sillimanite, and with them is mixed a nitrogenous organic substance. The most interesting constituents of the dust are little chondri of opaque, isotropic transparent, and double refractive material. The larger part of the dust is thought to be a sediment from the air, and to have been obtained by it from a region of crystalline schists. The chondri, on the other hand, are thought to be of cosmic origin, since they are similar to the chondri obtained in deep-sea soundings. If the amount of the dust collected from the snow in Greenland represents the fall of one year, the total amount falling upon the entire surface of the earth in this time is 125 million kilograms, equivalent to a cube of thirty-one yards on a side.—A new crystal refractometer has been devised by Czapski.²² Its construction and use is carefully described by the inventor in a recent paper in the *Neues Jahrbuch*.—That a definite relation exists between the habits of crystals of certain minerals and their mode of formation has long been recognized, but it has been left for Arzruni²³ to undertake a systematic study of this relation. In a

¹⁹ Ib., XI., 1890, p. 331.

²⁰ Bull. Soc. Franc. d. Min., XIII., 1890, p. 271.

²¹ *Neues Jahrb. f. Min.*, etc., B. B., VII., p. 152.

²² *Neues Jahrb. f. Min.*, etc., B. B., VII., p. 175.

²³ *Zeits. f. Kryst.*, XVIII., 1890, p. 44.

late paper this writer communicates the results of the examination of crystals of hematite produced by sublimation in smelting furnaces and those from San Sebastiano, Italy, that are supposed to have been formed in an analogous manner. In all of these the habit is the same, although different combinations of nearly related forms occur on them. Sublimed valentinite and senarmontite are likewise studied. Cuprite produced by slow oxidation at a low temperature has an octahedral or dodecahedral habit, while that produced at a high temperature is probably hexahedral. Struvite obtained from a solution of Koch's peptone differs materially from the natural mineral, but the differences have not yet been carefully enough studied to warrant any general conclusion being drawn from the observations. Further articles from Prof. Arzruni will be looked for with interest.

2
BOTANY.

The Relative Altitudes of the Rocky and Appalachian Mountain Systems as Influencing the Distribution of Northern Plants.—In the study of the geographical distribution of North American plants certain difficulties have been apparent since the adoption of three "regions," extending north and south, and denominated respectively the eastern, central, and western. A much better division of the continent is that proposed by Britton,¹ who recognizes a northern region, including British America, the Sierras, the Rockies, and the Alleghenies; and a southern region, including the Atlantic coast, Mississippi valley, and a part of California. Not only does such an arrangement of regions make it possible to group more correctly the known facts of spermatophytic distribution, but, to a certain extent, it corresponds more exactly with the probable method of original distribution of all plants over the continental area of North America. Since the glacial period the great drift-covered tracts have been covered with vegetation, spreading slowly from Siberia and Scandinavia on the north, and from Mexico and South America on the south. The flora of North America, then, exclusive of Mexico, is, for the most part, a resultant of the greater or less commingling of these two currents of vegetation, the one flowing constantly to the south, the other as constantly flowing northward.

¹ The General Distribution of North American Plants; by N. S. Britton. Meeting of the American Association for the Advancement of Science. 1890.